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10/784,352	02/23/2004	Aaron T. Timperman	22085/2102	2338

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EXAMINER

BARTON, JEFFREY THOMAS

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/784,352

Applicant(s)

TIMPERMAN, AARON T.

Examiner

Jeffrey T. Barton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 12, 14, 18-23, 33, 37-41 and 43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 12, 14, 18-23, 33, 37-41 and 43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 16 June 2005 has been entered.

### ***Response to Amendment***

2. The amendment filed on 16 June 2005 does not place the application in condition for allowance.

### ***Status of Objections and Rejections Pending Since the Office Action of 11 January 2005***

3. All objections and rejections of claims 1, 5-11, 24, and 28-32 are obviated due to cancellation of the claims.

4. The rejection of claims 12, 14, 18-22, 33, 37-39, 41, and 43 under 35 U.S.C. §103(a) as unpatentable over Xue et al in view of Karger et al and Lee et al is maintained.

5. The rejection of claims 23 and 40 under 35 U.S.C. §103(a) as unpatentable over Xue et al in view of Karger et al, Lee et al, and Kopf-Sill et al is maintained.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 12, 14, 18-23, 33, 37-41, and 43 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The newly added limitation that sample loss is "substantially eliminate[d]" is not supported by the specification. There is support for minimized or reduced sample loss in the passages from the specification cited by Applicant at page 9 of the remarks submitted on 16 June 2005, but there is no disclosure that such minimization amounts to substantial elimination.

***Claim Rejections - 35 USC § 103***

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 12, 14, 18-22, 33, 37-39, 41, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xue et al in view of Karger et al and Lee et al.

Relevant to claim 12, Xue et al disclose a microfluidic bi-directional capillary electrophoresis device (Figure 7b), comprising: a middle column (24 and 25), the middle column intersecting a first channel and a second channel (26 and 27) at a point wherein the middle column is approximately perpendicular to the first and second channels (23), a negative electrode in communication with the first channel and a positive electrode in communication with the second channel (33), wherein a mixture of anions and cations may be separated by drawing them towards the electrodes of opposite polarity.

Relevant to claim 33, Xue et al disclose a method of separating a sample of anions and cations in a microfluidic capillary system, comprising: delivering the sample to the middle column of the device described above in addressing claim 12 (Paragraph 0071 - sample in 28 and vacuum applied to 29 would lead to sample traveling through channels 24 and 25), positioning negative and positive electrodes (33) in communication with the first and second channels, thereby drawing anions and cations into the channel corresponding to the electrode of opposite polarity (Paragraph 0071, Figure 9)

Relevant to claims 19, 20, 38 and 39, Xue et al disclose first and second detectors in communication with the first and second channels, for the detection of cations and anions, respectively. (Detectors 52 and 53, Figure 7B; Paragraph 0054)

Relevant to claims 21 and 41, Xue et al disclose hydrodynamic flow resistance through variation of cross-sectional area in any or all channels. (Paragraph 0038)

Relevant to claim 22, Xue et al disclose devices comprising a pressure outlet. (Paragraphs 0034 and 0040; Line 47, Figure 2)

Xue et al do not explicitly disclose a coated first channel, a coated second channel, or a first channel engaged to a microfluidic system for proteome analysis (Claims 12 and 33); a first channel coated with Triton X-100 (Claims 18 and 37); or a second channel engaged to a second microfluidic system for proteome analysis. (Claims 14 and 43)

Relevant to claims 12, 18, 33, and 37, Karger et al disclose capillary channels that have been coated with Triton X-100 in order to reduce electroosmosis in electrophoretic separations. (Column 5, lines 3-39)

Relevant to claims 12 and 33, Lee et al disclose microfluidic systems for two-dimensional protein separations in proteome analysis (e.g. Figure 3, Paragraph 0033)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the devices and methods of Xue et al by coating the first and second channels (26 and 27) with Triton X-100, as taught by Karger et al, because it would reduce electroosmosis. Such coatings would be an obvious modification of the devices and methods of Xue et al, because it would be desirable to minimize electroosmosis in such a system, wherein oppositely charged analytes migrate in opposite directions within a channel. Excessive electroosmosis would lead to a bulk

flow that prevents migration in one of the directions, or leads to undesirably long migration times; as would have been obvious to one having ordinary skill in the art.

It would also have been obvious to one having ordinary skill in the art at the time the invention was made to modify the devices and methods of Xue et al by placing the channels (26 and 27) in communication with sample inlets to proteome analysis systems, such as those taught by Lee et al, because it would provide a more powerful analytical tool with an additional dimension of separation. Because Xue et al and Lee et al are directed towards quite similar problems (i.e. separation of proteins by electrophoresis within capillary channels formed on a substrate), the examiner considers that it would have been within the abilities of a skilled artisan to incorporate such known related prior art channel geometries, connectivity, and separation strategies as taught by Lee et al into the system of Xue et al, given a protein sample of sufficient complexity that it would require multiple stages of separation.

Regarding the newly added limitation in claims 12 and 33, "wherein the coating of the first channel and the coating of the second channel is applied in an amount to substantially eliminate sample loss", this would be an inherent property of the coating taught by Karger et al, since this coating substantially eliminates surface charge of the channel. [Karger, Column 6, line 56 - Column 7, line 33; this procedure will substantially eliminate surface -OH groups in any glass or silica channel, which are disclosed by Xue et al (Paragraph 0036)] Since surface -OH groups provide the source of charge on capillary walls and are the primary cause of sample loss as described by Applicant (Specification, page 3, line 25 - Page 4, line 23), a substantial elimination of surface

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charge would lead to substantial elimination of sample loss. As further evidence, the Triton X detergent specifically claimed as the coating in claim 18 is disclosed by Karger et al. (Column 5, lines 34-39) Therefore, no patentable difference is seen between the instant claims and the combination given above.

10. Claims 23 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xue et al, Karger et al, and Lee et al as applied to claims 12 and 33 above, and further in view of Kopf-Sill et al.

Xue et al, Karger et al, and Lee et al disclose combined devices and methods as disclosed above in addressing claims 12 and 33.

None among Xue et al, Karger et al, and Lee et al explicitly disclose the use of a dual-channel detector in communication with the first and second channels.

Kopf-Sill et al disclose the use of multichannel detectors in communication with one or more channels within their microfluidic device. (Figure 13; Paragraphs 0036 and 0088)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combinations of the devices and methods of Xue et al, Karger et al, and Lee et al by adjusting the position of separation channels such that they ran parallel and adjacent to each other and positioning a dual channel detector in communication with the channels, as taught by Kopf-Sill et al, because it would eliminate the need for multiple detectors.



***Response to Arguments***

11. Applicant's arguments filed on 16 June 2005 have been fully considered but they are not persuasive.

Regarding the newly added limitation in claims 12 and 33, "wherein the coating of the first channel and the coating of the second channel is applied in an amount to substantially eliminate sample loss", Applicant argues that Karger does not address the issue of sample loss, and therefore does not meet this new limitation. (Remarks, Page 10, 2<sup>nd</sup> full paragraph)

The examiner considers this limitation to be new matter, as stated above. However, even if it were not new matter, minimization or substantial elimination of sample loss as described by Applicant in the specification would be an inherent property of the coating taught by Karger et al, since this coating substantially eliminates surface charge of the channel. [Karger, Column 6, line 56 - Column 7, line 33; this procedure will substantially eliminate surface -OH groups in any glass or silica channel, which are disclosed by Xue et al (Paragraph 0036)] Since surface -OH groups provide the source of charge on capillary walls and are the primary cause of sample loss as described by Applicant (Specification, page 3, line 25 - Page 4, line 23), a substantial elimination of surface hydroxyls would lead to substantial elimination of sample loss. As further evidence, the Triton X detergent specifically claimed as the coating in claim 18 is disclosed as a coating material by Karger et al. (Column 5, lines 34-39) Therefore, no patentable difference is seen between the instant claims and the combination given above.


**Conclusion**

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey Barton, whose telephone number is (571) 272-1307. The examiner can normally be reached Monday-Friday from 8:30 am – 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached at (571) 272-1342. The fax number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).

JTB  
3 August 2005

  
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